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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/688,952	10/21/2003	Hyung-Taek Lim	249/415	3321

7590 08/13/2004
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EXAMINER


DO, AN H

ART UNIT PAPER NUMBER

2853

DATE MAILED: 08/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/688,952	Applicant(s) LIM ET AL. 	
	Examiner An H. Do	Art Unit 2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 May 2004.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
4a) Of the above claim(s) 12-30 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-11 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 21 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/24/04, 2/26/04, 10/21/03</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The Response to Election/Restriction Requirement filed on 24 May 2004 has been acknowledged.

Election/Restrictions

1. Applicant's election of Group I, claims 1-11 in the reply filed on 24 May 2004 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. Claims 12-30 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 24 May 2004.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

4. The information disclosure statements (IDS) submitted on 21 October 2003, 26 February 2004, and 24 March 2004 were filed and are being considered by the examiner.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

Art Unit: 2853

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 2, 7-9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US 6,412,918) in view of Gordon et al (US 5,855,835).

Regarding claim 1, Chen et al disclose the following claimed features:

A monolithic ink-jet printhead (Figure 3), comprising:

- a substrate (combination of isolation layer 120 and second substrate 130) having an ink chamber (chamber where the vapor bubble 140 is formed and an etched area of isolation layer 120) to be supplied with ink to be ejected, a manifold (132) for supplying ink to the ink chamber, and an ink channel (122) in communication with the ink chamber (chamber where the vapor bubble 140 is formed and an etched area of isolation layer 120) and the manifold (132);
- a nozzle plate (made of layers 100, 112, 114, 116, 118) including a plurality of passivation layers (layers 112, 114, 118) stacked on the substrate (120, 130) and a heat dissipating layer (first substrate 100, column 3, lines 16-18, first substrate 100 is made of metal and metal radiates heat) stacked on the plurality of passivation layers (layers 112, 114, 118);
- a nozzle (106), including a lower part and an upper part, the nozzle penetrating the nozzle plate so that ink ejected from the ink chamber is ejected through the nozzle;
- a heater (resistor 110) provided between adjacent passivation layers of the plurality of passivation layers of the nozzle plate, the heater (110) being located above the ink chamber for heating ink within the ink chamber; and

-a conductor (trace conductors patterned on the conductive layer 116, column 4, lines 47-50) between adjacent passivation layers of the plurality of passivation layers of the nozzle plate, the conductor being electrically connected to the heater (110) for applying current to the heater, wherein the heat dissipating layer is made of a thermally conductive metal for dissipating heat (first substrate 100, column 3, lines 16-18, first substrate 100 is made of metal and metal radiates heat) from the heater (110), the lower part of the nozzle (106) is formed by penetrating the plurality of passivation layers (112, 114, 118).

Regarding claim 2, wherein the plurality of passivation layers include first (112), second (114), and third (118) passivation layers sequentially stacked on the substrate (120, 130), the heater (110) is formed between the first (112) and second (114) passivation layers, and the conductor (trace conductors patterned on the conductive layer 116, column 4, lines 47-50) is formed between the second (114) and third (118) passivation layers.

Regarding claim 7, wherein the nozzle plate (100, 112, 114, 116, 118) has a heat conductive layer (116) located above the ink chamber (Figure 3), the heat conductive layer (116) being insulated from the heater (110) and the conductor (trace conductors patterned on the conductive layer 116, column 4, lines 47-50) and thermally contacts the substrate (120, 130) and the heat dissipating layer (100).

Regarding claim 8, wherein the heat conductive layer is made of a metal (column 4, lines 47-50).

Regarding claim 9, wherein the conductor (trace conductors patterned on the conductive layer 116, column 4, lines 47-50) and the heat conductive layer (116) are made of the same metal (since trace conductors are patterned on the conductive layer 116, it is presumed both conductors and conductive layer are made of the same metal) and located on the same passivation layer (118).

Regarding claim 11, further comprising: a nozzle guide (sidewall portion 134) extending into the ink chamber formed in the lower part (where the layers 112, 114, 116, 118 are penetrated) of the nozzle (106).

Chen et al do not disclose the following:

Further regarding claim 1, the upper part of the nozzle is formed by penetrating the heat dissipating layer in a tapered shape in which a cross-sectional area thereof decreases gradually toward an exit thereof.

Gordon et al teaches in Figures 1 and 2 the following :

Further regarding claim 1, the upper part (top plate 10) of the nozzle (12) is formed by penetrating the layer (10) in a tapered shape in which a cross-sectional area thereof decreases gradually toward an exit thereof (column 3, lines 14-15) for the purposes of increasing the velocity of an ejected ink droplet and enabling more precise printing (column 3, lines 15-21).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the upper part of the nozzle formed by penetrating the heat dissipating layer in a tapered shape in which a cross-sectional area thereof decreases gradually toward an exit thereof, as taught by Chen et al into Gordon et al, for the

purposes of increasing the velocity of an ejected ink droplet and enabling more precise printing (column 3, lines 15-21).

7. Claims 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US 6,412,918) in view of Gordon et al (US 5,855,835) as applied to claim 1 above, and further in view of Silverbrook (US 5,841,452).

Chen et al as modified by Gordon et al do not disclose the following:

Regarding claim 3, wherein the lower part of the nozzle has a cylindrical shape.

Regarding claim 10, further comprising: an insulating layer interposed between the conductor and the heat conductive layer.

Silverbrook teaches in Figures 9 and 12 the following:

Regarding claim 3, wherein the lower part (cavity 112) of the nozzle (110) has a cylindrical shape (column 8, lines 59-63). It would have been further obvious to one having ordinary skill in the art at the time the invention was made to have the lower part of the nozzle with a cylindrical shape, as taught by Silverbrook into Chen et al as modified by Gordon et al, for the purpose of obtaining variety of useful nozzle geometries (column 8, lines 61-63).

Regarding claim 10, further comprising: an insulating layer (132) interposed between the conductor (123) and the heat conductive layer (first metal level layer 134). It would have been further obvious to one having ordinary skill in the art at the time the invention was made to have the lower part of the nozzle with a cylindrical shape, as taught by Silverbrook into Chen et al as modified by Gordon et al, for the purpose of

providing electrical insulation for the heater as well as mechanical cushioning (column 7, lines 7-12).

8. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US 6,412,918) in view of Gordon et al (US 5,855,835) as applied to claim 1 above, and further in view of Radke et al (US 5,859,654).

Chen et al as modified by Gordon et al do not disclose the following:

Regarding claim 4, wherein the heat dissipating layer is formed by electroplating to a thickness of about 10-50 μm , and the upper part of the nozzle has a length of about 10-50 μm .

Regarding claims 5 and 6, wherein the heat dissipating layer is made of a transition element metal, wherein the transition element is nickel or gold.

Radke et al teaches the following:

Regarding claim 4, wherein the heat dissipating layer (nozzle plate 14) is formed by electroplating to a thickness of about 10-50 μm (column 3, lines 36-38), and the upper part of the nozzle (which is also considered as the nozzle plate 14) has a length of about 10-50 μm (the thickness of the nozzle plate 14 is 50 μm , column 3, lines 36-38), for the purpose of providing an oxide that will chemically bond to the adhesion promoter (column 3, lines 44-45).

Regarding claims 5 and 6, wherein the heat dissipating layer (nozzle plate 14) is made of a transition element metal, wherein the transition element is nickel or gold (column 3, lines 36-37), for the purpose of providing an oxide that will chemically bond to the adhesion promoter (column 3, lines 44-45).

It would have been further obvious to one having ordinary skill in the art at the time the invention was made to have the heat dissipating layer is formed by electroplating to a thickness of about 10-50 μm , and the upper part of the nozzle has a length of about 10-50 μm ; and the heat dissipating layer is made of a transition element metal, wherein the transition element is nickel or gold, as taught by Radke et al into Chen et al as modified by Gordon et al, for the purpose of providing an oxide that will chemically bond to the adhesion promoter (column 3, lines 44-45).

Contact Information

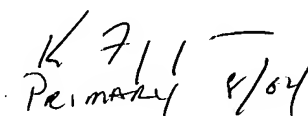
9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to An H. Do whose telephone number is 571-272-2143. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on 571-272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


AHD
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July 28, 2004


Primary Examiner 7/1/04